UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/681,040	10/07/2003	Pawel Czubarow	1035-O4280	2721

34456 7590 07/13/2007
LARSON NEWMAN ABEL POLANSKY & WHITE, LLP
5914 WEST COURTYARD DRIVE
SUITE 200
AUSTIN, TX 78730

EXAMINER	
KRUER, KEVIN R	

ART UNIT	PAPER NUMBER
1773	

MAIL DATE	DELIVERY MODE
07/13/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

MAILED
JUL 13 2007
GROUP 1700

Application Number: 10/681,040
Filing Date: October 07, 2003
Appellant(s): CZUBAROW ET AL.

John Schell
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed March 20, 2007 appealing from the Office action mailed August 10, 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is incorrect. After reviewing the prosecution, dependent claims 16-18, 33, 34, 38, and 39 are held to be allowable over the prior art. A correct statement of the status of the claims is as follows:

This appeal involves claims 1-13, 19-31, 35, 36, 40-42, and 51-53.

Claims 16-18, 33, 34, 38, and 39 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. As a result of the Office vacating the rejections of claims 16-18, 33, 34, 38, and 39, changes were necessary. The changes are as follows:

Claims 1-13, 21, 23-31, 35, 36, 40-42, and 51-53 are rejected under 35 U.S.C. § 103(a) over Duvall et al, (US 6,391,442) in view of Yamazaki et al. (WO 03/004580).

Claims 1-13, 16-31, 35, 36, 40-42, and 51-53 are rejected under 35 U.S.C. § l03(a) over Duvall in view of Hill (EP 0794 227 A2).

Claims 1, 2, 6, 7, 10-l3, 19-23, 25, 27, 28, 30, 31, 35, 36, 40-42, and 51-53 are rejected under 35 U.S.C. § l03(a) over Bunyan et al. (US 6,054,198) in view of Hill.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

EP 0794227A2	HILL	03-1997
WO 03/004580A1	YAMAZAKI et al	01-2003
6,391,442 B1	DUVALL et al	05-2002
6,054,198	BUNYAN et al	04-2000

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

1. Claims 1-13, 21, 23-31, 35, 36, 40-42 and 51-53 stand rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,391,442 (herein referred to as "Duvall') in view of WO 03/004580 (herein referred to as Yamazaki).

Duvall teaches a thermal interface material that is to be provided between a heat sink and a heat source. The interface material includes thermally conductive filler particles dispersed in a phase change material. The phase change material softens and flows at the operating temperature of the heat source, thereby providing good thermal contact with uneven surfaces of the heat source and heat sink. The phase change material includes a polymer component and a melting point component, which adjusts the softening temperature of the phase change material to the operating temperature of the heat source (abstract). The composition may further comprise wetting agents, herein understood to read on the claimed "surfactant." (col 7, lines 4+). The phase change material is preferably wax or a wax like material such as 2-{2-{2-(2-hydroxyethoxy) ethoxy}ethoxy} ethyl ester (herein relied upon to read on the claimed hydroxylated wax of claim 3) (col 6, lines 11+). The wax is included in amounts of 10-80wt% preferably 20-60wt% (col 6, lines 60+) and has a melting point of 30-120°C (col 5, lines 46+). The polymer component may comprise acrylic polymers or silicone polymers (col 6, lines 1+) and is included in amounts of 10-70wt% (col 6,lines 61+). The conductive particle may comprise boron nitride (col 5, lines 28+) and is included in amounts of 10-80wt% of the material (col 6, lines 61+).

The heat source is herein understood to read on the claimed "conductive film" of claim 36 and the protective release film is herein understood to read on the claimed "protective barrier" of claim 41 (col 4, lines 7+).

Duvall teaches the composition may comprise a wax does not teach that at least 7wt% of a surfactant may be utilized as said wax. However, Yamazaki teaches a thermoconductive composition comprising (a) 100 parts by weight wax, (b) 10-1,000pbw of a polymer of formula (I), (c) 10-2,000pbw thermoconductive filler, and (d) 0-1,000pbw of a softener (abstract). The wax may comprise a fatty acid amide (page 3, lines 31+) such as stearic amide-herein relied upon to read on the claimed non-ionic surfactant. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a fatty acid amide in a blend with the wax taught in the primary reference. The motivation for doing so would have been that said fatty acid amide is functionally equivalent to the wax taught therein. The courts have held that it is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose in order to form a third composition to be used for the very same purpose. The idea of combining them flows logically from their having been individually taught in the prior art.

With regard to the claimed wetting angle of claims 50-52, it is known in the art that the amount of surfactant utilized is proportional to the wetting angle of the composition. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the amount of surfactant added to the thermal interface composition in order to optimize the composition's wetting angle.

Furthermore, the examiner takes the position that the claimed "thermal impedance of "less than or equal to 0.8x" is inherent to a composition with the claimed wetting angle since the surfactant insures homogeneous dispersion of the conductive particles.

Duvall does not teach the claimed thermal impedance. However, Duvall teaches that the thermal conductance of the composition may be controlled by selecting the particle size, particle distribution, and filler loading concentration of the conductive particle (col 5, lines 40+). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the conductive particle's size, distribution, and concentration in order to obtain the desired thermal impedance.

2. Claims 1-13, 19-31, 33, 34, 40-42, and 51-53 stand rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,391,442 (herein referred to as "Duvall') in view of EP 0794,227 (herein referred to as Hill).

Duvall teaches a thermal interface material that is to be provided between a heat sink and a heat source. The interface material includes thermally conductive filler particles dispersed in a phase change material. The phase change material softens and flows at the operating temperature of the heat source, thereby providing good thermal contact with uneven surfaces of the heat source and heat sink. The phase change material includes a polymer component and a melting point component, which adjusts the softening temperature of the phase change material to the operating temperature of the heat source (abstract). The phase change material is preferably wax or a wax like material such as 2-{2-{2-(2-hydroxyethoxy) ethoxy}ethoxy} ethyl ester (herein relied upon to read on the claimed hydroxylated wax of claim 3) (col 6, lines

11+). The wax is included in amounts of 10-80wt% preferably 20-60wt% (col 6, lines 60+) and has a melting point of 30-120°C (col 5, lines 46+). The polymer component may comprise acrylic polymers or silicone polymers (col 6, lines 1+) and is included in amounts of 10-70wt% (col 6,lines 61+). The conductive particle may comprise boron nitride (col 5, lines 28+) and is included in amounts of 10-80wt% of the material (col 6, lines 61+).

The heat source is herein understood to read on the claimed "conductive film" of claim 36 and the protective release film is herein understood to read on the claimed "protective barrier" of claim 41 (col 4, lines 7+).

Duvall is relied upon as above, but does not teach that the composition should further comprise at least 7wt% of a nonionic surfactant. However, Hill teaches a thermoconductive composition comprising a boron nitride particle and a polymer base material (abstract). Hill teaches the composition should further comprise nonionic surfactants selected from the class of carboxylic acid amides and carboxylic acid esters (abstract) in order to provide the material with flow (page 1, lines 45+). The surfactant is included in amounts of greater than 1% (claim 1). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add more than 1wt% nonionic surfactants to the composition taught in the primary reference. The motivation for doing so would have been that nonionic surfactants improve the flow of thermoconductive compositions.

With regard to the claimed wetting angle of claims 51-52, it is known in the art that the amount of surfactant utilized is proportional to the wetting angle of the composition. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the amount of surfactant added to the thermal interface composition in order to optimize the composition's wetting angle. Furthermore, the examiner takes the position that the claimed "thermal impedance of "less than or equal to 0.8x" is inherent to a composition with the claimed wetting angle since the surfactant insures homogeneous dispersion of the conductive particles.

Duvall does not teach the claimed thermal impedance. However, Duvall teaches that the thermal conductance of the composition may be controlled by selecting the particle size, particle distribution, and filler loading concentration of the conductive particle (col 5, lines 40+). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the conductive particle's size, distribution, and concentration in order to obtain the desired thermal impedance.

3. Claims 1, 2, 6, 7, 10-13, 19-23, 25, 27, 28, 30, 31, 35, 36, 40-42 and 51-53 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Bunyan (US 6,054,198) in view of EP 0794,227 (herein referred to as Hill).

Bunyan teaches a thermally conductive interface for conductively cooling heat generating electronic components. The composition is interposable between the thermal interface of a heat source and a thermal dissipation member (col 4, lines 39+). The film may take the form of a tape with a release sheet (col 7, lines 33+) and is applied to the interface surface of the dissipation member (col 7, lines 61+). The composition comprises 25-50wt% of a pressure sensitive adhesive, 50-75wt% of an olefinic material having a melting temperature of 50-60°C, and 20-80wt% of a thermally conductive filler (col 8, lines 16+). The adhesive may comprise an acrylic polymer (col 7, lines 30+). The olefinic low melt component may comprise a wax (col 9, lines 9+). The conductive filler may comprise boron nitride (col 9, lines 50+. The composition may further comprise a wetting agent, herein relied upon to read on the claimed surfactant (col 9, lines 59+).

Bunyan does not teach that the composition may comprise a surfactant. However, Hill teaches a thermoconductive composition comprising a boron nitride particle and a polymer base material (abstract). Hill teaches the composition should further comprise nonionic surfactants selected from the class of carboxylic acid amides and carboxylic acid esters (abstract) in order to provide the material with flow (page 1, lines 45+). The surfactant is included in amounts of greater than 1% (claim 1). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add more than 1wt% nonionic surfactants to the composition taught in the primary reference. The motivation for doing so would have been that nonionic surfactants improve the flow of thermoconductive compositions.

With regard to the claimed wetting angle of claims 50-52, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the amount of surfactant added to the thermal interface composition in order to obtain said wetting angle. Furthermore, the examiner takes the position that the claimed "thermal impedance of "less than or equal to 0.8x" is inherent to a composition with the claimed wetting angle since the surfactant insures homogeneous dispersion of the conductive particles.

Bunyan does not teach the claimed thermal impedance of claim 50. However, Bunyan teaches that the thermal conductance of the composition may be controlled by selecting filler loading concentration of the conductive particle (col 9, lines 35+). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the particle size, distribution and concentration in order to obtain the desired thermal impedance.

(10) Response to Argument

Appellant argues that Duvall is silent regarding the use of non-ionic surfactants. The examiner agrees but notes that Duvall was never relied upon for such a teaching. Rather, Yamazaki was relied upon to render obvious the claimed non-ionic surfactant. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Appellant further argues Yamazaki fails to teach or suggest blends specifically including non-ionic surfactants. The examiner respectfully disagrees. Yamazaki teaches a thermoconductive composition comprising wax, a polymer, a thermoconductive filler, and a softener. Yamazaki teaches the wax may comprise fatty acid amide (stearic amide), which is a known non-ionic surfactant in the art (see US 4,063,889; col 9, lines 50+).

According to Appellant, Yamazaki further fails to teach or suggest blends of components in specific amounts, one being non-ionic surfactants in an amount greater than about 7%by weight. The examiner respectfully disagrees. The courts have held that it is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose in order to form a third composition to be used for the very same purpose. The idea of combining them flows logically from their having been individually taught in the prior art. Thus, it would have been obvious to the skilled artisan to utilize a blend of wax and fatty acid amide surfactant as the wax component of Duvall. Contrary to appellant's arguments (middle of page 9), the case law does not require that functional equivalence be completely substituted for one another. Furthermore, the courts have held that it is not inventive to discover the optimum or workable range by routine experimentation when the general conditions of the claimed invention are disclosed in the prior art (See MPEP 2141.05). Thus, it would have been obvious to the skilled artisan at the time the invention was made to optimize the amount of surfactant utilized in the wax/surfactant blend.

Appellant argues the claimed invention exhibits unexpected results with regards to improved peel strength and reduced thermal impedance when said substances are combined. Appellant points to the examples in the specification in support of said conclusion. Said data has been fully considered but is not persuasive because it is not commensurate in scope with the claims. It is not clear what surfactant was utilized in the examples, if the surfactant is representative of all nonionic surfactants, and whether the composition of the inventive and comparative examples are indicative of the claimed composition and closest prior art, respectively.

2. Claims 16, 33, and 38 (page 10)

Said arguments are persuasive. Claims 16, 33, and 38 are allowable over the prior art.

3. Claim 17 (page 12)

Said arguments are persuasive. Claim 17 is allowable over the prior art.

4. Claim 34 (page 13)

Said arguments are persuasive. Claim 34 is allowable over the prior art.

5. Claim 35 (page 13)

Appellant argues the references do not suggest use of greater than about 10% of a stearic amide. The examiner respectfully disagrees for the same reasons noted above with regards to claim 1.

6. Claim 51 (page 14)

The examiner agrees with Appellant's position that Duvall and Yamazaki fail to explicitly teach that the thermal impedance of the thermal interface material is "less than or equal to 0.8x." In order to meet said limitation, the examiner took the position that it is known in the art that the amount of surfactant utilized is proportional to the wetting angle of the composition. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the amount of surfactant added to the thermal interface composition in order to optimize the composition's wetting angle.

Furthermore, the examiner takes the position that the claimed "thermal impedance of "less than or equal to 0.8x" is inherent to a composition with the claimed wetting angle since the surfactant insures homogeneous dispersion of the conductive particles. Duvall does not teach the claimed thermal impedance. However, Duvall teaches that the thermal conductance of the composition may be controlled by selecting the particle size, particle distribution, and filler loading concentration of the conductive particle (col 5, lines 40+). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the conductive particle's size, distribution, and concentration in order to obtain the desired thermal impedance. Appellant fails to present evidence to demonstrate the examiner erroneously concluded the claimed limitation is inherent to the composition rendered obvious by the prior art. Thus, the rejection is maintained.

7. Claim 52 (page 14)

See the examiner's comments above with regards to claim 51.

8. Claim 53 (page 16)

Appellant argues the references do not suggest use of greater than about 7% of a stearic amide surfactant. The examiner respectfully disagrees for the same reasons noted above with regards to claim 1.

B. Rejection of claims under 35 U.S.C. 103(a) over Duvall in view of Hill

1. Claims 1-13, 21-31, 36, and 40-42 (page 16)

With respect to Duvall in view of Hill, Appellant argues the teachings of Hill are primarily directed to the use of the minimum necessary non-ionic surfactant to achieve dispersion of the filler, and only recognizes the benefit of the surfactant up to 4.5wt% (page 3, lines 19-21). The examiner disagrees and notes the teachings of the reference allow for the use of more than 4.5wt% of the surfactant. Specifically, the composition taught in Hill comprises *at least* 1wt% of said non-ionic surfactant (see claim 1). While Hill acknowledges that detrimental effects may be observed if too much surfactant is utilized, Hill does not teach the use of additional surfactant above said point where detrimental results are observed destroys the beneficial results associated with the surfactant or destroys the invention in general. Appellant notes that all the examples utilize less than 5wt% surfactant. Said observation is noted, but appellant is reminded the teachings of a reference are not limited to the inventive/preferred examples disclosed therein.

Appellant argues the claimed invention exhibits unexpected results with regards to improved peel strength and reduced thermal impedance when said substances are combined. Appellant points to the examples in the specification in support of said conclusion. Said data has been fully considered but is not persuasive because it is not commensurate in scope with the claims. It is not clear what surfactant was utilized in the examples, if the surfactant is representative of all nonionic surfactants, and whether the composition of the inventive and comparative examples are indicative of the claimed composition and closest prior art, respectively.

2. Claims 16, 33, and 38 (page 18)

Said arguments are persuasive. Claims 16, 33, and 38 are allowable over the prior art.

3. Claim 17 (page 19)

Said arguments are persuasive. Claim 17 is allowable over the prior art.

4. Claims 18, 34, and 39 (page 19)

Said arguments are persuasive. Said claims are allowable over the prior art.

5. Claims 19 and 35 (page 20)

Appellant argues the references do not suggest use of greater than about 10% of a non-ionic surfactant. The examiner respectfully disagrees for the same reasons noted above with regards to claim 1.

6. Claim 20 (page 21)

Appellant argues the references do not suggest use of between 14wt% and 25wt% of a non-ionic surfactant. The examiner respectfully disagrees for the same reasons noted above with regards to claim 1.

7. Claim 51 (page 21)

Appellant argues the references fail to explicitly teach the claimed thermal impedance of the thermal interface material. The examiner agrees but took the position that it is known in the art that the amount of surfactant utilized is proportional to the wetting angle of the composition. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the amount of surfactant added to the thermal interface composition in order to optimize the composition's wetting angle. Furthermore, the examiner takes the position that the claimed "thermal impedance of "less than or equal to 0.8x" is inherent to a composition with the claimed wetting angle since the surfactant insures homogeneous dispersion of the conductive particles.

8. Claim 52 (page 22)

See the examiner's comments above with regards to claim 51.

9. Claim 53 (page 16)

Appellant argues the references do not suggest use of greater than about 7% of a non-ionic surfactant. The examiner respectfully disagrees for the same reasons noted above with regards to claim 1.

C. Rejection of claims under 35 U.S.C. 103(a) over Bunyan in view of Hill

1. Claims 1, 6, 6, 10-13, 21-23, 25, 27, 28, 30, 31, 36, and 40-42 (page 24)

With respect to Bunyan in view of Hill, Appellant incorrectly concludes that the PTO appears to rely on the polymer or the PSA component to meet the claimed polymer component of claim 1 and appears to rely on the paraffin wax to meet the claimed phase change wax of claim 25. The PSA is relied upon to read on the claimed polymer component of claim 1. The olefinic low melt component is understood to read on the claimed wax. Vybar 260(taught as the preferred olefinic low melt component) is known in the art as a wax (see US 6,399,1981; US 6,080,800).

Appellant further argues the teachings of Hill are primarily directed to the use of the minimum necessary non-ionic surfactant to achieve dispersion of the filler, and only recognizes the benefit of the surfactant up to 4.5wt% (page 3, lines 19-21). The examiner disagrees and notes the teachings of the reference allow for the use of more than 4.5wt% of the surfactant. Specifically, the composition taught in Hill comprises *at least* 1wt% of said non-ionic surfactant (see claim 1). While Hill acknowledges that detrimental effects may be observed if too much surfactant is utilized, Hill does not teach the use of additional surfactant above said point where detrimental results are observed destroys the beneficial results or destroys the invention in general. Appellant further notes that all the examples utilize less than 5wt% surfactant. Said observation is noted, but appellant is reminded that the teachings of a reference are not limited to the inventive/preferred examples disclosed therein.

Appellant argues the claimed invention exhibits unexpected results with regards to improved peel strength and reduced thermal impedance when said substances are combined. Appellant points to the examples in the specification in support of said conclusion. Said data has been fully considered but is not persuasive because it is not commensurate in scope with the claims. It is not clear what surfactant was utilized in the examples, if the surfactant is representative of all nonionic surfactants, and whether the composition of the inventive and comparative examples are indicative of the claimed composition and closest prior art, respectively.

2. Claims 2 (page 26)

Appellant argues that the proposed combination lacks either a phase change wax or a polymer component. The examiner respectfully disagrees. Bunyan teaches a composition comprising (a) 20-50wt% PSA, and (b) 50-75wt% of an olefinic material having a melting temperature of 50-60C (col 8, lines 16+). The olefinic low melt component is understood to read on the claimed wax. Vybar 260, taught as the olefinic low melt component, is known in the art as a wax (see US 6,399,1981; US 6,080,800).

3. Claims 16, 33, and 38 (page 26)

Said arguments are persuasive. Claims 16, 33, and 38 are allowable over the prior art.

4. Claim 17 (page 27)

Said arguments are persuasive. Claim 17 is allowable over the prior art.

5. Claims 18, 34, and 39 (page 27)

Said arguments are persuasive. Said claims are allowable over the prior art.

6. Claims 19 and 35 (page 28)

Appellant argues the references do not suggest use of greater than about 10% of a non-ionic surfactant. The examiner respectfully disagrees for the same reasons noted above with regards to claim 1.

7. Claim 20 (page 29)

Appellant argues the references do not suggest use of between 14wt% and 25wt% of a non-ionic surfactant. The examiner respectfully disagrees for the same reasons noted above with regards to claim 1.

8. Claim 51 (page 29)

Appellant argues the references fail to explicitly teach the claimed thermal impedance of the thermal interface material. The examiner agrees but took the position that it is known in the art that the amount of surfactant utilized is proportional to the wetting angle of the composition. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the amount of surfactant added to the thermal interface composition in order to optimize the composition's wetting angle. Furthermore, the examiner takes the position that the claimed "thermal impedance of "less than or equal to 0.8x" is inherent to a composition with the claimed wetting angle since the surfactant insures homogeneous dispersion of the conductive particles.

9. Claim 52 (page 30)

See the examiner's comments above with regards to claim 51.

10. Claim 53 (page 31)

Appellant argues the references do not suggest use of greater than about 7% of a non-ionic surfactant. The examiner respectfully disagrees for the same reasons noted above with regards to claim 1.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Kevin R. Kruer-Patent Examiner, Art Unit 773

Conferees:

Carol Chaney-SPE, Art Unit 1773

/Kathryn Gorgos/

Kathryn Gorgos- TQAS Tech Center 1700